

WHAT IS CLAIMED IS:

- 1           1.     A peristaltic pump comprising:  
2                     a plurality of movable occluding surfaces;  
3                     a plurality of independently movable occlusion fingers, wherein the  
4     plurality of fingers are integrally formed as a single unitary body; and  
5                     a plurality of springs independently resiliently biasing the plurality of  
6     occlusion fingers.
- 1           2.     The pump of Claim 1, wherein the springs comprise leaf springs.
- 1           3.     The pump of Claim 1, wherein the springs are integrally formed as  
2     part of a single unitary body.
- 1           4.     The pump of Claim 1 including rollers rotatably supported  
2     proximate the tubes, wherein the rollers provide the occluding surfaces.
- 1           5.     The pump of Claim 1, wherein each finger includes a channel  
2     partially receiving one of the tubes.
- 1           6.     The pump of Claim 1, wherein the fingers extend along an arc.
- 1           7.     The pump of Claim 1 including fluid couplers supported adjacent  
2     each of the occlusion fingers.
- 1           8.     The pump of Claim 1 including a channeling member supported  
2     proximate the fingers.
- 1           9.     The pump of Claim 1, wherein the fingers are integrally molded as a  
2     single unitary body out of a polymeric material.
- 1           10.    The pump of Claim 1, wherein the fingers pivot about a common  
2     axis.

1           11. The pump of Claim 1, wherein the occluding surfaces move along a  
2 path into and out of engagement with the tubes and wherein the fingers pivot  
3 about a substantially common axis adjacent the path.

1           12. The pump of Claim 1, wherein the occluding surfaces rotate about  
2 a first common axis and wherein the springs pivot about a second axis parallel  
3 to the first axis.

1           13. The pump of Claim 1, wherein the occluding surfaces move along a  
2 path into and out of engagement with the tubes, wherein each of the fingers  
3 has a first end and a second opposite end and wherein the first end and the  
4 second opposite end extend adjacent to the path.

1           14. The pump of Claim 1 including:  
2               fluid conduits fluidly coupled to the pumping tubes; and  
3               a holder coupled to the fingers and the springs, wherein the holder  
4 includes a surface against which the fluid conduits extend.

1           15. The pump of Claim 14, wherein the holder is removably and  
2 directly coupled to the fingers without fasteners.

1           16. The pump of Claim 15, wherein the springs are removably and  
2 directly coupled to the holder without fasteners.

1           17. The pump of Claim 16, wherein the springs are releasably coupled  
2 to and engaging to the fingers without fasteners.

1           18. The pump of Claim 14 including fluid couplers coupled to and  
2 supported by the holder.

1           19. The pump of Claim 14 including a channeling member extending  
2 from the surface.

1           20.   The pump of Claim 1 including pumping tubes, wherein the  
2   occluding surfaces move along a path into and out of engagement with the  
3   tubes and wherein the pump further includes:  
4               first fluid couplers connected to a first end of the pumping tubes  
5   adjacent the path; and  
6               second fluid couplers connected to a second end of the pumping  
7   tubes adjacent the path.

1           21.   The pump of Claim 1 including fluid couplers coupled to and  
2   supported by fingers.

1           22.   The pump of Claim 1 including a tube channeling member  
2   supported proximate the fingers.

1           23.   The pump of Claim 1 including:  
2               pumping tubes; and  
3               first fluid conduits fluidly coupled to a first end of the pumping  
4   tubes, wherein the pumping tubes have a first flow area of cross sectional flow  
5   area and wherein the first fluid conduits have a second smaller interior cross  
6   sectional flow area.

1           24.   The pump of Claim 23 including fluid couplers between the  
2   pumping tubes and the first fluid conduits.

1           25.   The pump of Claim 23, wherein the pumping tubes extend on a  
2   first side of the fingers and wherein the first fluid conduits extend on a second  
3   opposite side of the fingers.

1           26.   The pump of Claim 25 including second fluid conduits fluidly  
2   coupled to a second opposite end of the pumping tubes, wherein the second  
3   fluid conduits extend on the second side of the fingers.

1           27.   The pump of Claim 23 including second fluid conduits fluidly  
2   connected to a second opposite end of the pumping tubes.

1           28. The pump of Claim 27, wherein the pumping tubes each have a  
2 first interior cross sectional flow area and wherein the second fluid conduits  
3 each have a second smaller interior cross sectional flow area.

1           29. The pump of Claim 23 including fluid sensors at least proximate an  
2 interior of the pumping tubes.

1           30. The pump of Claim 23 including fluid couplers connected to the  
2 pumping tubes, wherein the fluid sensors are located within the fluid couplers.

1           31. A peristaltic pump comprising:  
2               movable occluding surfaces;  
3               independently movable occlusion fingers;  
4               springs independently resiliently biasing the plurality of occlusion  
5 fingers, wherein the springs are integrally formed as part of a single unitary  
6 body; and  
7               a drive system configured to move the occluding surfaces.

1           32. A peristaltic pump comprising:  
2               movable occluding surfaces;  
3               independently movable occlusion fingers;  
4               springs independently resiliently biasing the occlusion fingers; and  
5               fluid couplers supported by the fingers.

1           33. A peristaltic pump comprising:  
2               pumping tubes, each tube having a flexible wall portion;  
3               movable occluding surfaces on a first side of the pumping tubes;  
4               independently movable occlusion fingers on a second opposite side  
5 of the tubing tubes;  
6               springs independently resiliently biasing the occlusion fingers  
7 towards the pumping tubes;  
8               a drive system configured to move the occluding surfaces so as to  
9 compress the tubes against the fingers; and

fluid couplers connected to the pumping tubes, wherein at least one of the fluid couplers includes a fluid sensor.

34. A peristaltic pump comprising:  
movable occluding surfaces;  
an occlusion including:  
a base portion; and  
occlusion fingers pivotally coupled to the base portion;  
a holder releasably and directly coupled to the base portion of the occlusion without fasteners;  
a spring system including:  
a base portion releasably and directly coupled to the holder without fasteners; and  
springs extending from the base portion into engagement with the fingers; and  
a drive system configured to move the occluding surfaces.

35. A peristaltic pump comprising:  
fluid passages, wherein each fluid passage includes a compressible portion;  
a first unit having independently movable surfaces adjacent the compressible portion of each of the fluid passages;  
a second unit having biasing means for resiliently biasing the occlusion surfaces against movement away from the compressible portions; and  
means for compressing the compressible portions of the fluid passages to move fluid along the fluid passages.

36. An occlusion for use in a peristaltic pump, the occlusion comprising:  
independently movable occlusion fingers, wherein the fingers are integrally formed as a single unitary body.

1           37.    The occlusion of claim 74, wherein each of the fingers includes  
2    means for retaining a tube in place.

1           38.    The occlusion of claim 74, wherein each of the fingers is  
2    configured to support a fluid coupler.

1           39.    A spring system for use in a peristaltic pump, the spring system  
2    comprising:  
3                a base portion; and  
4                resilient spring fingers extending from the base portion, wherein the  
5    base portion and the resilient spring fingers are integrally formed as part of a  
6    single unitary body.

1           40.    A printer comprising:  
2                an ink dispensing pen;  
3                ink reservoirs; and  
4                a pump comprising:  
5                    pumping tubes in fluid communication with the ink reservoirs  
6    and the ink dispensing pen, each tube having a flexible wall portion;  
7                    movable occluding surfaces on a first side of the pumping  
8    tubes;  
9                    independently movable occlusion fingers on a second  
10   opposite side of the pumping tubes, wherein the fingers are integrally formed as  
11   a single unitary body; and  
12                springs independently resiliently biasing the occlusion fingers  
13   towards the pumping tubes; and  
14                a drive system configured to move the occluding surfaces so as to  
15   compress the tubes against the fingers.